Well Defined Macromolecule-Magnetic Nanoparticle Complexes

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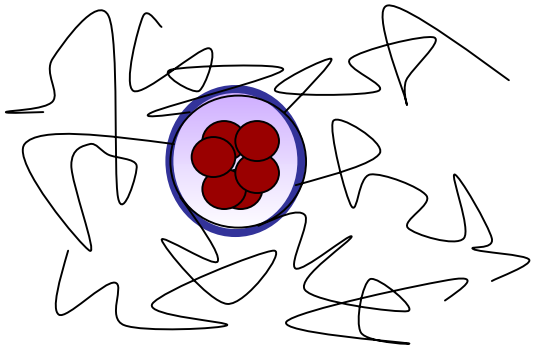
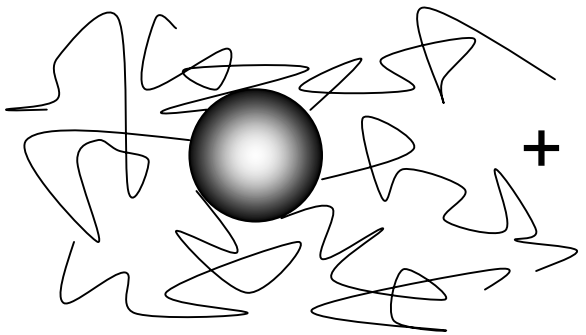
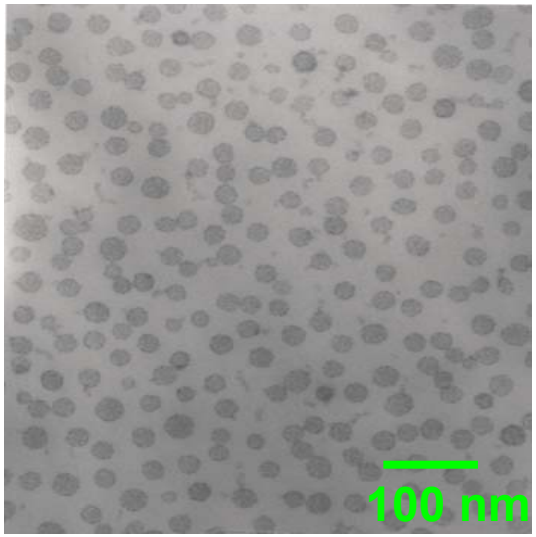
Magnetic cobalt nanoparticles are synthesized in block copolymer micellar templates from soluble organometallic precursors, then annealed at 500-700 ^{O}C. During annealing, the copolymer sheath pyrolyzes to form a robust, graphitic-like coating. Specific saturation magnetization of these cobalt nanoparticles is near the upper theoretical limit for bulk cobalt (150-160 emu/g) and the metals are stable against oxidation.



Thermolysis of $Co_2(CO)_8$





Well-Defined Macromolecule-Magnetic Nanoparticle Complexes may lead to improved treatments for retinal detachments….

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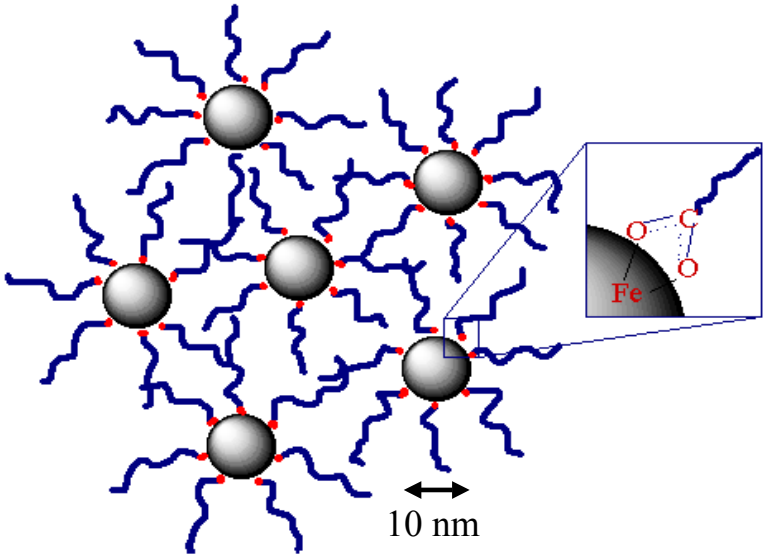
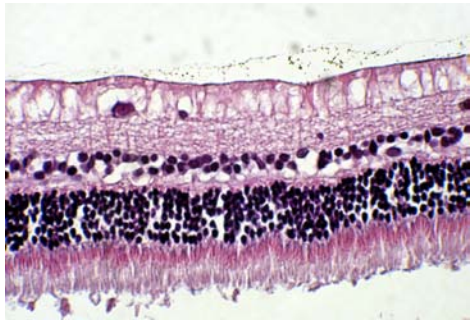
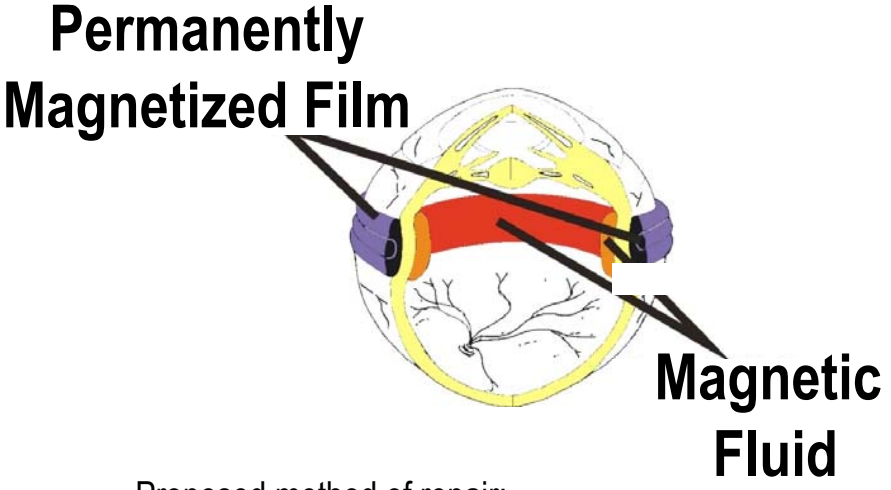


Magnetic fluids comprised of polydimethylsiloxane-magnetite nanoparticles dispersed in PDMS oligomers are proposed as internal tamponades for treating detachments. There are ~1000 cases of retinal detachment per year, many of which cannot be treated.



Studies in rabbits after insertion of the fluids for a month show no damage to retinal function and histology shows to toxicity



Proposed method of repair:

- The magnetic silicone fluid would be held at a retinal break by an external magnetized film inserted underneath the outer scleral membrane
- Offers full 360° protection
- Does not require removal of the vitreous gel
- Has potential for moving complicated retinal surgeries to out-patient procedures